

Docket No. EHAR0010
US App. No. 09/856,402

REMARKS

Status of the Application

Claims 1-10 are pending, of which claims 1, 3, and 4 are rejected under 35 USC 102(b) as being anticipated by Dryer et al. (US 5,128,281), claims 2, 7, and 8 are rejected under 35 USC 103(a) as being unpatentable over Dryer et al in view of Miyamoto (US 6,280,294), and claims 5, 6, 9, and 10 are rejected under 35 USC 103(a) as being unpatentable over Dryer et al and Miyamoto, and further in view of Aguro et al (US 4,426,151) and Mizuguchi (US 5,076,026).

Applicant has amended claims 1 and 2, and added new claims 11-17. No new matter adds through the amendments. For the reasons discussed below, withdrawal of the rejections is requested.

Claim Rejections- 35 U.S.C. 102(b)

Claims 1, 3, and 4 are rejected under 35 USC 102(b) as being anticipated by Dryer et al. (US 5,128,281).

Applicant respectfully traverses the rejection for reasons discussed below. Nevertheless, Applicant has amended claim 1 to more clearly define the present invention.

The amended claim 1 reads as:

1. A polishing machine for a peripheral edge of a semiconductor wafer, said machine comprising:

a rotary mechanism for holding a semiconductor wafer while rotating it in a prescribed direction;

a rotary body which rotates relative to the semiconductor wafer while maintaining a prescribed gap from a periphery of said semiconductor wafer, having a rotary axis which is set in the same direction as the rotary axis of said semiconductor wafer, so that the rotary body and the semiconductor wafer are not in contact with each other during a complete polishing process;

a polishing solution channel for channeling the flow of polishing solution to said gap; and
a polishing solution supply portion for supplying the polishing solution to said polishing solution channel;

wherein said polishing solution is drawn into said gap between the peripheral edge of said semiconductor wafer and said rotary body, and polishing abrasive particles in said polishing solution collide with the peripheral edge of said semiconductor wafer to conduct non-contact polishing of the peripheral edge of said semiconductor wafer.

Dryer does not teach or suggest the above underlined features of claim 1. In the present

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invention as defined in claim 1, a prescribed gap is maintained between the rotary body and the peripheral edge of the wafer, a polishing solution is drawn into the gap and polishing abrasive particles in the polishing solution collide with the peripheral edge of said semiconductor wafer to conduct non-contact polishing. The rotary body and the semiconductor wafer are not in contact with each other during a complete polishing process. While in Dryer, the polishing of the wafer edge is a contact polishing process. Dryer specifically teaches that, during the polishing process “[T]he wafer edges are in contact with pad 15a”. Col. 2, lines 36-37. Dryer does not teach or suggest maintaining a prescribed gap between the rotary body and the peripheral edge of the wafer through out the polishing process. Clearly, in Dryer, the polishing is mainly done by the polishing pad 15a, while the present invention as defined in claim 1, the polishing abrasive particles in a polishing solution collide with the peripheral edge of said semiconductor wafer to conduct non-contact polishing.

For at least the reasons discussed above, Dryer cannot anticipate claim 1. For at least the same reasons, Dryer cannot anticipate claims 3 and 4, which depend on claim 1. In addition, Dryer does not teach or suggest the dynamic pressure generating grooves recited in claim 4 either.

Withdrawal of the rejection is requested.

Claim Rejections- 35 U.S.C. 103(a)

Claims 2, 7, and 8 are rejected under 35 USC 103(a) as being unpatentable over Dryer et al in view of Miyamoto (US 6,280,294).

Applicant respectfully traverses the rejection. Nevertheless, Applicant has amended claim 2 to more clearly define the present invention.

The amended claim 2 reads as:

2. A polishing machine for a peripheral edge of a semiconductor wafer, said machine comprising:

a rotary mechanism for holding a semiconductor wafer while rotating it in a prescribed direction;

a rotary body which rotates relative to the semiconductor wafer while maintaining a prescribed gap from a periphery of said semiconductor wafer, having a rotary axis which is set in the same direction as the rotary axis of said semiconductor wafer, so that the rotary body and the semiconductor wafer are not in contact with each other during a complete polishing process;

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a polishing solution tank for immersing said rotary mechanism and said rotary body in polishing solution; and

a polishing solution circulation portion for circulating the polishing solution in and out of said polishing solution tank;

wherein said polishing solution is drawn into said gap between the peripheral edge of said semiconductor wafer and said rotary body, and polishing abrasive particles in said polishing solution collide with the peripheral edge of said semiconductor wafer to conduct non-contact polishing of the peripheral edge of said semiconductor wafer.

As discussed above in connection with claim 1, Dryer does not teach or suggest the above underlined features of claim 2.

Miyamoto clearly cannot cure the deficiencies of Dryer. In fact, Miyamoto also teaches a contact polishing process. In Miyamoto, an inner end surface of a glass substrate is polished using the abrasive liquid by rotating brush 4 or a polishing pad *in contact with* the inner peripheral end surface. (See the Abstract).

For at least the reasons discussed above, Dryer and Miyamoto cannot render claim 2 obvious. For at least the same reasons, claims 7 and 8 which depend on claim 2 are also patentable over Dryer and Miyamoto. In addition, neither Dryer nor Miyamoto teaches or suggests the dynamic pressure generating grooves recited in claim 8.

For the reasons discussed above, claims 2, 7, and 8 are patentable over Dryer and Miyamoto.

Claims 5, 6, 9, and 10 are rejected under 35 USC 103(a) as being unpatentable over Dryer et al. and Miyamoto, and further in view of Aguro et al (US 4,426,151) and Mizuguchi (US 5,076,026).

Aguro and Mizuguchi were cited to supply the missing elements of Dryer and Miyamoto. However, none of Aguro and Mizuguchi can cure the above discussed deficiencies of Dryer and Miyamoto. Therefore, there no need to further discuss whether or not Aguro and Mizuguchi truly teach the other elements of the claimed invention as alleged in the Office Action.

In addition, Applicant believes that Mizuguchi is non-analogous art and cannot be combined with Dryer to support a 35 U.S.C 103 rejection. Mizuguchi describes a microscopic grinding device and a method for precision (<0.01 μm) grinding a minute area in the field of

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manufacture of lenses and other optical devices, which is quite different from polishing a peripheral edge of semiconductor wafer.

For at least the reasons discussed above, claims 1 and 2 as well as their dependent claims 5, 6, 9, and 10 are patentable over Dryer, Miyamoto, Aguro, and Mizuguchi.

New Claims

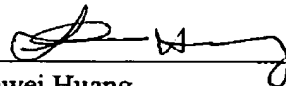
New claims 11-17 have been added to more fully protect the invention. Claims 11-17 depend, directly or indirectly, on claim 1. Therefore, they are patentable for the same reasons as discussed above in connection with claim 1. In addition, these dependent claims contain further features that further distinguish over the cited prior art.

Conclusion

In view of the foregoing amendments and remarks, it is respectfully submitted that claims 1-17 are now in condition for allowance. Allowance of this application is earnestly solicited.

Respectively submitted
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